

WHAT IS CLAIMED IS:

1 1. An isolated and purified nucleic acid which hybridizes under stringent
2 conditions comprising hybridization in aqueous solution containing 4-6x SSC at 65-68° C,
3 or 42° C in 50% formamide, to a polynucleotide that codes for human *RRN3* polypeptide,
4 or the full length complement of the polynucleotide, wherein the Rrn3 polypeptide
5 comprises the contiguous amino acid sequence of SEQ ID NO:2, or a fragment thereof,
6 which Rrn3 polypeptide or fragment thereof stimulates ribosomal RNA transcription.

1 2. The nucleic acid of claim 1, which is genomic DNA, cDNA, mRNA or
2 antisense RNA.

1 3. The nucleic acid of claim 1, which encodes human Rrn3 polypeptide of
2 SEQ ID NO:2.

1 4. The nucleic acid of claim 1, which hybridizes under stringent conditions
2 comprising hybridization in aqueous solution containing 4-6x SSC at 65-68° C, or 42° C in
3 50% formamide, to an oligonucleotide of 25 or more contiguous nucleotides of SEQ ID
4 NO:1 or the full length complement of the oligonucleotide.

1 5. An isolated nucleic acid encoding human Rrn3 polypeptide, wherein the
2 nucleic acid is a polynucleotide comprising the sequence set forth in SEQ ID NO:1.

1 6. An isolated polypeptide comprising the contiguous sequence of SEQ ID
2 NO:2, or a functionally active fragment, derivative or analog thereof.

1 7. An expression construct comprising the following operably linked
2 elements:

3 a transcriptional promoter;

4 a *RRN3* polynucleotide which hybridizes under stringent conditions
5 comprising hybridization in aqueous solution containing 4-6x SSC at 65-68°, or 42° C in
6 50% formamide, to a polynucleotide encoding a Rrn3 polypeptide or the full length
7 complement of the polynucleotide, wherein the Rrn3 polypeptide comprises the

8 contiguous amino acid sequence of SEQ ID NO:2 or a fragment thereof, which Rrn3
9 polypeptide or fragment thereof stimulates rRNA transcription; and
10 a transcriptional terminator.

1 8. The expression construct of claim 7, wherein the *RRN3* polynucleotide
2 encodes the human Rrn3 polypeptide of SEQ ID NO:2.

1 9. The expression construct of claim 7, wherein the *RRN3* polynucleotide is
2 the sequence set forth as SEQ ID NO:1.

1 10. The expression construct of claim 7, wherein the transcriptional
2 promoter is a heterologous promoter.

1 11. The expression construct of claim 7, wherein the transcriptional
2 promoter comprises at least a portion of the human *RRN3* promoter.

1 12. A cultured prokaryotic or eukaryotic cell transformed or transfected
2 with the expression construct of claim 7.

1 13. The eukaryotic cell of claim 12, which is a mammalian cell.

1 14. The eukaryotic cell of claim 12, wherein the *RRN3* polynucleotide
2 encodes the human Rrn3 polypeptide of SEQ ID NO: 2.

1 15. The eukaryotic cell of claim 12, wherein the *RRN3* polynucleotide is
2 the sequence set forth as SEQ ID NO:1.

1 16. The prokaryotic cell of claim 12, which is an *E. coli* cell.

1 17. The eukaryotic cell of claim 12, which is an *S. cerevisiae* cell.

1 18. A vector comprising the expression construct of claim 7.

1 19. An isolated host cell comprising the vector of claim 18.

- 1 20. A method for producing a Rrn3 polypeptide, which comprises:
2 growing cells transformed or transfected with the vector of claim 18; and
3 isolating the Rrn3 polypeptide from the cells.
- 1 21. The method of claim 20, wherein the cells are bacterial cells.
- 1 22. The method of claim 20, wherein the cells are *S. cerevisiae* cells.
- 1 23. The method of claim 20, wherein the cells are cultured mammalian
2 cells.
- 1 24. The method of claim 20, wherein the cells express human Rrn3
2 polypeptide as depicted in SEQ ID NO: 2.
- 1 25. An antibody that binds to human Rrn3 polypeptide.
- 1 26. The antibody of claim 25, which is a monoclonal antibody, a
2 polyclonal antibody, a single chain antibody, a heavy chain antibody, an F(ab')₂, F(ab'), or
3 Fv fragment.
- 1 27. A eukaryotic polypeptide, or a functionally active fragment thereof,
2 comprising the consensus sequences:
3 (i) Tyr(Ile/Leu)(Ala/Gly)(Ala/Ser)(Phe/Tyr)(Ile/Leu)(Ala/Ser)ArgAlaLys;
4 (ii) PheTyr(Ala/Ser)XaaXaaGln(Ala/Ser)(Ile/Leu)XaaXaaXaa
5 (Phe)XaaPheArg; and
6 (iii) PhePro(Phe/Tyr)AspXaaXaaXaaLeu(Lys); wherein Xaa can be any
7 amino acid, and wherein the polypeptide, or fragment thereof, stimulates ribosomal RNA
8 transcription; with the proviso that the polypeptide or fragment is not *Saccharomyces*
9 *cerevisiae* Rrn3.
- 1 28. A method of identifying agonists or antagonists of a eukaryotic Rrn3
2 polypeptide comprising:
3 administering a candidate compound to a first cell that expresses a first
4 Rrn3 polypeptide;

administering the candidate compound to a second cell that expresses a second different Rrn3 polypeptide;
and determining whether the candidate compound produces a physiological change by the first cell, but not by the second cell.

29. The method of claim 28, wherein the first and second cells are yeast cells having a null allele of the yeast *RRN3* gene.

30. The method of claim 28, wherein the first and second cells are mammalian cells.

31. The method of claim 28, wherein the second Rrn3 polypeptide is human Rrn3 polypeptide.

32. The method of claim 28, wherein the first Rrn3 polypeptide is a derivative of the first Rrn3 polypeptide.

33. The method of claim 28, wherein the candidate compound inhibits growth or division of the first cell.

34. The method of claim 28, wherein the candidate compound stimulates growth or division of the first cell.

35. A method of screening for hypoproliferative or hyperproliferative disease comprising:
obtaining a sample comprising polynucleotides from a subject;
contacting the sample with a nucleic acid that hybridizes under stringent conditions comprising an aqueous solution containing 4-6x SSC at 65-68° C, or 42° C in 50% formamide, to a *RRN3* nucleic acid that codes for human *RRN3* polypeptide, or the full length complement of the *RRN3* nucleic acid, wherein the Rrn3 polypeptide comprises the contiguous amino acid sequence of SEQ ID NO:2, or a fragment thereof, which Rrn3 polypeptide or fragment thereof stimulates ribosomal RNA transcription; and
determining whether aberrant levels of *RRN3* gene expression are present in the sample.

1 36. The method of claim 35, wherein the subject is a mammal.

1 37. The method of claim 36, wherein the subject is human.

1 38. The method of claim 35, wherein the disease is cancer, malignancy,
2 hyperplasia, metaplasia, dysplasia, benign tumor, hyperproliferative disorder, a benign
3 dysproliferative disorder, an autoimmune disease or cardiac disease.

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